

A23 Recycling of Washing machines



Illustration 1: Fire boxes



Illustration 2: Fire boxes

Waste Reduction

Repairing washing machines the faulty parts are often in a form to be recycled. All that is needed is a couple of bins to put the scrap metal into.

Recycling for scrap metal

Scrap Steel. Most scrap metal dealers will accept washing machine for donations, will pay when there is about ½ tonne of more. They pay pressing steel rate. Most council recycling centre will accept whites goods for recycling without a charge provided they are not mixed with general waste.

Non-ferrous metal scrap

PCV copper wire. The PCV does not need to be burnt off. It is illegal to burn PVC covered wire.

Aluminium. Most like the cast aluminium separated from the sheet and extrusions.

Zinc die castings. Can pick the difference to aluminium by weight (density).

Brass and copper. Machines do not have much of this.

Electric Motors. Motors with steel and copper winding pay a reasonable amount, can be worth pulling them out of a machine. The same applies to solenoid and water valves (put the valve in a vice and break the coil off with a hammer).

Copper & aluminium radiators in refrigeration. No need to separate it.

Plastic. Some major cities have plastic recycling centres which allow donations of plastic. Check with the centre to what they take. Modern machines have much more plastic now.

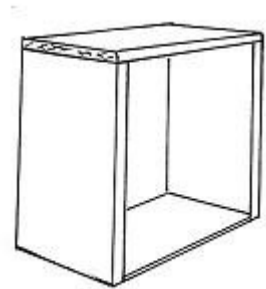


Illustration 3: Work Bench

Reuse of Washing Machine Parts.

Fire boxes. Washing machine wash bowl can be used as fire boxes. However most machine now use plastic bowls which are not suitable. Illustration 1 shows old Hoover and Simpson spin bowl with legs made from washing machine parts.

Workshop Benches. Old Simpson washers could be used, remove all the parts, bend the top over and screw on some timber for a top. Other brands may also be suitable

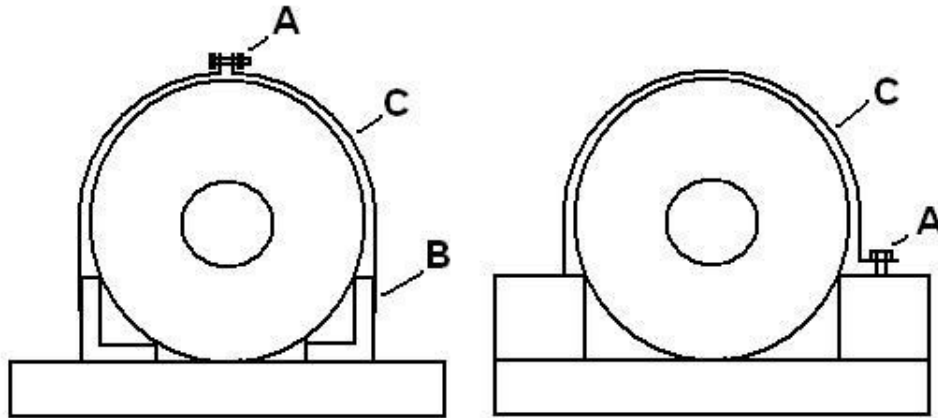


Illustration 4: Suggested Motor Mounting

Electric Motors.

Washing machine motors can be used to drive workshop machinery. These motors were made to operate inside an enclosed cabinet and will have live exposed terminals. Guard need to be made to protect live terminals from contact and to prevent entry of water or dust.

Earthing. The motor and the machinery that the motor is mounted in needs to be earth with a green/Yellow or green wire, no smaller than the mains lead earth wire.

Mains Lead Clamping. The mains lead needs to be clamped to the motor or machinery so that when the mains lead is pulled or twisted no force is applied to the connections.

Wiring. This is not easy. I have published a booklet on wiring washing machine motors. See my web page (information) for purchasing details.

Suggested Motor Mounting

See illustration 4. A wooden or steel frame can be made to hold the motors. "A" is the clamping bolt, "C" is a sheet metal strip (ie builder metal strip with holes) and "B" is angle iron.

Types of motors (The following is an extract from my booklet)

Washing machines use several types of single phase electric motors. There are series motors or induction motors, the three types of induction motors are shown in the table.

Type of Motor	Speed	Starting Torque	Starting Current	Comment
Series Motor	Variable with load	High	High	Power tools, vacuum cleaner, front loader washing machines
Induction: split phase	Almost Constant	Medium	Medium	General purpose motor. USA and old Aust. machines
Induction: capacitor run	Almost constant	Lower	Lower	Used in Asian & Australian Machines
Induction: shaded pole	Almost constant	Low	Low	Small fans & small drain pumps Low efficiency, suitable only for very small motors

Series Motors

These motors have carbon brushes and are used in front loader washing machines, electric drills and other small appliances . Also called universal motors.

When used in a front loader washing machine they have speed of about 15000rpm for the spin cycle(full power) and about 800rpm for wash cycle (reduced power by electronic controller)

Electronic controller limit the power to the motor and reduces the power out put. The controller from the FL washer are not suitable for this use, but they do sense the motor speed and automatically adjust. Jaycar sell electric drill speed controller which should control the speed, but without the speed sensor.

Induction Motors

AC induction motors speed is determined by the windings and the main frequency. Most are 1440rpm, some are 2880rpm (for pumps etc.), Some are 2 speed with 1440 and 960rpm.

Some front loader have two speed motors of 2880 rpm (spin speed) and 310 rpm(wash speed) and have power rating of 0.12HP and 0.07HP (not very powerful!!), have some of these cheap with only the 310 rpm working. There are two types of induction motors, split phase and capacitor run as shown in the above table.

Induction Motors :Split phase

These have two sets of windings, a run winding and a start winding. Power is applied to both windings and when the motor get up to its operating speed a centripetal switch turn off the power to the start winding. Two speed motors have have a third winding for the slower speed. Most washing machines the motors are 1/3 HP but some are 1/2 HP. These motors can run in either direction and switching can be wired to do it.

These can be used for general workshop use, including concrete mixers, small saws etc.

Induction Motors: Capacitor run

These have two sets of run windings, one direct to the power and the other through a capacitor. In the washing machine the motor is switch to run forward and reverse at regular intervals for the agitation.

These have less power and are suitable for “light” duty use. They are generally one speed, but some front loaders have two speed (2880rpm and 310rpm see above).

Shaded pole motors

These are small motor used for drain pumps and fans (in fridges and exhaust fans). They rotate at 2880rpm.

Fisher & Paykel Motors

These are inverter technology motors and suitable for making into wind generators. LG use the same type of motors. Google “Fisher & Paykel for wind generators” for instructions.

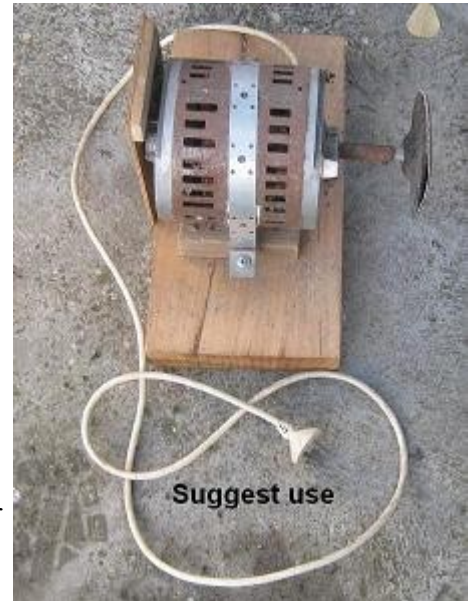


Illustration 5: Light duty mounting

Use of Faulty Motors

Induction motors: split phase with faulty start winding can still be used. They motors are not self starting. They need to be rotated when the power is turned on. They can be used for grinding wheels, wire brushes and sanding disks as shown in the illustration 5. Motor speed is 1440rpm, some two speed with 960rpm.also.

Mounting sanding disk instruction.

Light duty mounting. Mounted firmly the motor, rotate in the correct direction. Use a centre drill in a chuck held by hand and drill a starting hole. Now drill the required size hole for the sanding disk etc. Now drill and tap a hole for a grub screw on the side of the shaft.

Heavy duty mounting. Make or obtain a sleeve as show in the picture with the wire brush.

Alternative: The Hoover motor has a bolt into the centre of the shaft and his can be used to clamp the unit to the shaft with small hole, cotter pin and washer on the other side.



Illustration 6: Heavy duty mounting

Gray Water Pump from a Dishwasher

Converting a dishwasher to a gray water or rain water pump with a holding tank. Instruction on my web site. (Information)